

EXECUTIVE SUMMARY

Evidence suggests that occupational exposure to magnetic fields can have adverse health effects, but the results of epidemiologic studies on these increasingly ubiquitous exposures remain controversial. Improving the classification of the magnitude of occupational magnetic field exposures is an important step toward improving our understanding of their health effects. The goal of this study was to develop, pilot-test, and evaluate a task-based time-log approach to assessing occupational exposures to magnetic fields. It is the investigators' intent that, using this approach, researchers will ultimately be able to utilize task-based time logs to categorize occupational exposures for epidemiologic or group analyses. It will thus be possible to classify exposure in a resource-efficient manner, without the need for extensive field exposure measurements.

In this study, a list of 32 exposure-relevant tasks was developed using several governmental lists of job classifications and descriptions, with California workers as the population of interest. This list, which captures the tasks performed by an estimated 86% of all workers in California, was converted to a task-based time-log that was pilot-tested and evaluated using a population of magnetic field-exposed utility workers in Colorado. Personal exposure and location-specific magnetic field strength data collected for these workers was used in a preliminary evaluation of the task-based time-log approach to classifying exposure to magnetic fields. Using task-based time-logs and empirical exposure data together, a preliminary task exposure matrix could be developed, and its internal consistency and plausibility could be assessed.

Data modeling used both a classical analysis of variance (category) design for the between subject component of personal exposure readings, and a robust regression method of estimation. Mean exposure components for specific activities were compared for different estimation methods, and activity exposure estimates were compared across various jobs. The task-specific exposure data and task-based time logs were applied to reconstruct estimates of each person's time-weighted average exposure. These exposure estimates showed good agreement ($R^2 = 0.8$) with the measured magnetic field exposures, suggesting that the exposure coefficients associated with the tasks in the model were both internally

consistent and plausible, and lending credence to a task-based exposure assessment approach.

This study's limitations include the use of a small and non-independent sample population for evaluation of the task-based time-log approach to classifying exposure, as well as the incomplete capture of all tasks in the list, and the potential lack of generalizability to the general working population from a relatively highly exposed population. Nonetheless, the results suggest that task-based time-log approach is promising and may ultimately provide a resource-efficient method of estimating exposures to magnetic fields for epidemiologic studies.